

CLAIMS

I claim:

5

1. A color-tunable light emitter, comprising:
a first electrode;
a light-generating layer adjacent the first electrode, the light-generating layer operable to generate light in a band of wavelengths;
10 an electro-optical layer;
a second electrode adjacent the electro-optical layer, and
a corrugated metal layer between the light-generating layer and the electro-optical layer, the corrugated metal layer coupling a sub-band of the light from the light-generating layer to the electro-optical layer, the sub-band having a center wavelength
15 dependent on a voltage applied to at least one of the electrodes.

2. The light emitter of claim 1, additionally comprising a diffuser layer adjacent the second electrode.

- 20 3. The light emitter of claim 1, additionally comprising an optical waveguide between the light-generating layer and the corrugated metal layer:

4. The light emitter of claim 3, in which the optical waveguide comprises a layer having a thickness in the range from about 500 nm to about 1,000 nm.

25

5. The light emitter of claim 4, in which the layer comprises a material selected from nitrides and fused silica.

6. The light emitter of claim 1, in which the light-generating layer comprises a
30 material selected from an electro-luminescent material, a photo-luminescent material, and a cathode-luminescent material.

7. The light emitter of claim 1, in which the electro-optical layer comprises liquid crystal material.

5 8. The light emitter of claim 7, in which the liquid crystal material is a nematic liquid crystal material and is encapsulated in a porous silicon matrix.

9. The light emitter of claim 1, in which the second electrode is transparent in the band of wavelengths.

10

10. The light emitter of claim 1, in which:
the light generated by the light-generating layer has a brightness dependent on a first voltage applied between the first electrode and the corrugated metal layer; and
the center wavelength of the sub-band is dependent on a second voltage applied
15 between the second electrode and the corrugated metal layer.

11. A method for generating color-tunable light, the method comprising:
providing an electro-optical layer and a corrugated metal layer;
juxtaposing the corrugated metal layer and the electro-optical layer;
20 illuminating the corrugated metal layer with light in a band of wavelengths;
coupling a sub-band of the light through the corrugated metal layer to the electro-optical layer, the sub-band having a center wavelength; and
adjusting the refractive index of the electro-optical layer to tune the center
wavelength.

25

12. The method of claim 11, in which the adjusting comprises changing a voltage across the electro-optical material.

13. The method of claim 11, in which the illuminating comprises:
30 providing a light-generating layer; and
juxtaposing the light-generating layer and the corrugated metal layer.

14. The method of claim 13, in which:
the light-generating layer comprises photo-luminescent material; and
the illuminating additionally comprises optically pumping the photo-luminescent
5 material.
15. The method of claim 13, in which:
the light-generating layer comprises electro-luminescent material; and
the illuminating additionally comprises applying voltage across the electro-
10 luminescent material.
16. The method of claim 11, in which the illuminating comprises generating the light
by one of electro-luminescence, photo-luminescence, and cathode-luminescence.
- 15 17. The method of claim 11, in which the illuminating comprises:
providing an optical waveguide layer;
juxtaposing the optical waveguide layer and the corrugated metal layer; and
illuminating the optical waveguide layer.
- 20 18. A color display, comprising:
opposed electrodes, at least one of the electrodes comprising electrode segments
defining respective color-tunable light emitters; and
between the electrodes, a layer structure comprising:
a light-generating layer operable to generate light in a band of wavelengths.
25 an electro-optical layer, and
a corrugated metal layer between the light-generating layer and the electro-optical
layer, the corrugated metal layer coupling a sub-band of the light generated by the light-
generating layer to the electro-optical layer, the sub-band having a center wavelength, the
center wavelength of each of the color-tunable light emitters dependent on a voltage
30 applied to the respective one of the electrode segments.

19. The display of claim 18, additionally comprising dielectric spacers between the electrode segments.

5 20. The display of claim 19, in which the dielectric spacers extend through the layer structure.

21. The display of claim 18, in which the electro-optical layer comprises liquid crystal material.

10

22. The display of claim 21, in which the liquid crystal material is a nematic liquid crystal material and is encapsulated in a porous silicon matrix.

15

23. The display of claim 18, in which the second electrode is transparent in the band of wavelengths.

24. The display of claim 18, in which both electrodes comprise electrode segments.

20

25. The display of claim 24, in which, in each of the color-tunable light emitters:
the light generated by the light-generating layer has a brightness dependent on a first voltage applied between the corrugated metal layer and the respective one of the electrode segments the one of the electrodes adjacent the light-generating layer; and
the center wavelength of the sub-band is dependent on a second voltage applied between the corrugated metal layer and the respective one of the electrode segments of
25 the electrode adjacent the electro-optical layer.